

A DFG Priority Program for Nuclear Astrophysics

Our draft re-submission, 2015

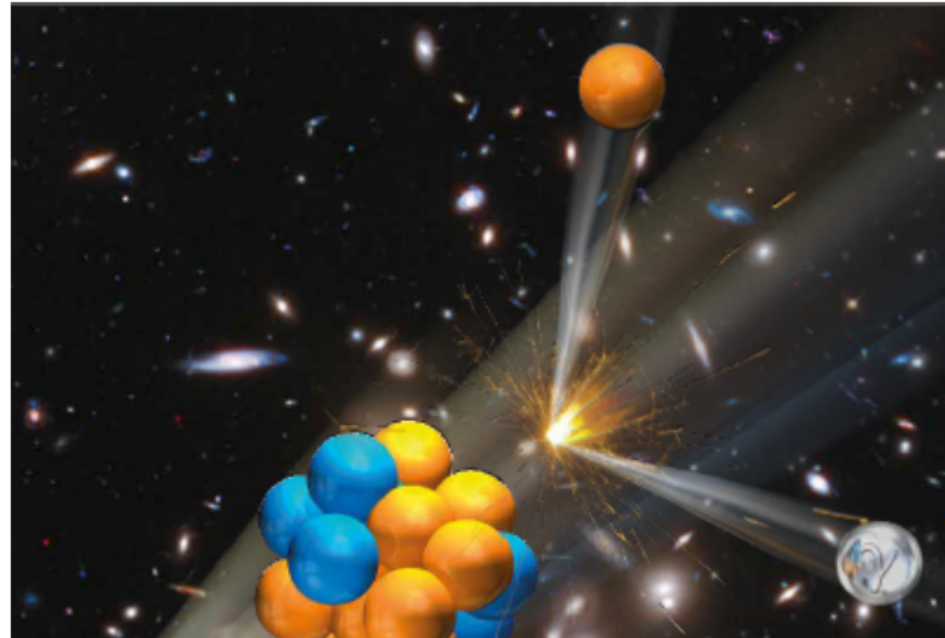
The criticisms

- Too ambitious
- Too broad
- Not focused on feasible results

The new scope

- Focus on elements up to Fe group
 - Avoid overlaps with “heavy-element”/”r-process”
- Focus on specific questions

- Re-working the SPP Proposal



Program Committee

Prof. Dr. René Reifarth (Coordinator; Goethe Universität, Frankfurt)
Nuclear Reaction Experiments for Astrophysics

Prof. Dr. Roland Diehl (Vice-Coordinator, MPE Garching)
Nuclear Astronomy and Nucleosynthesis

Dr. Cristina Chiappini (Leibniz Institute für Astrophysik Potsdam)
Astronomy, Cosmic Chemical Evolution

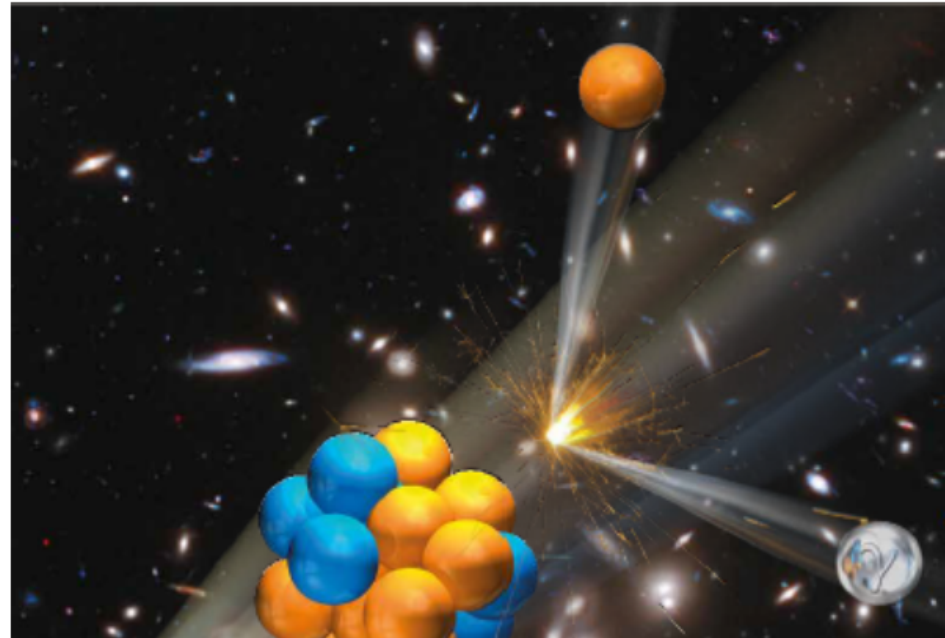
Prof. Dr. Gabriel Martinez-Pinedo (Technische Universität Darmstadt)
Theoretical Nuclear Physics in Astrophysics

Prof. Dr. Martin Pohl (Universität Potsdam)
Nuclear and Cosmic-Ray Astrophysics

Prof. Dr. Friedrich Röpke (Universität Würzburg)
Supernova Models and Nucleosynthesis

ONE Question

What are the origins of carbon, nitrogen, oxygen, silicon, iron – the cosmic nuclei and isotopes that shape the conditions for life in the current universe?



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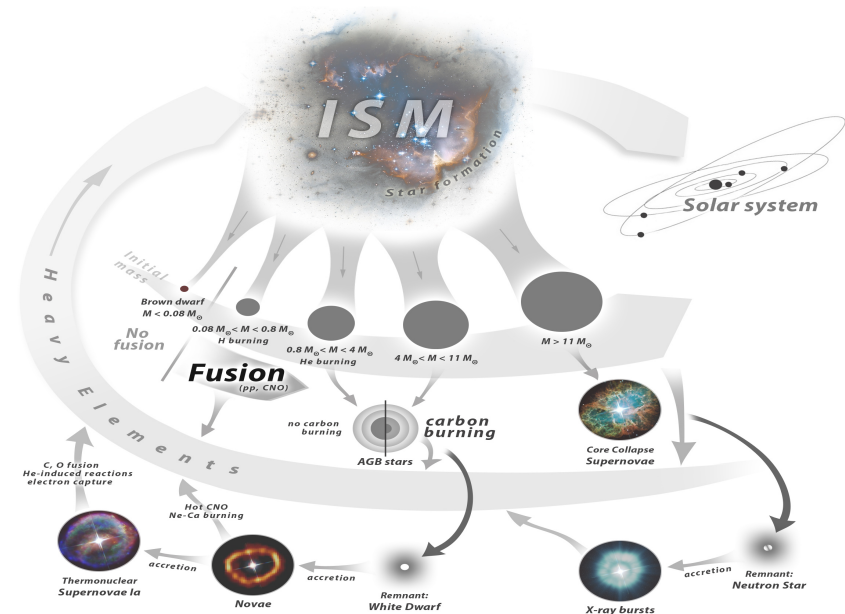
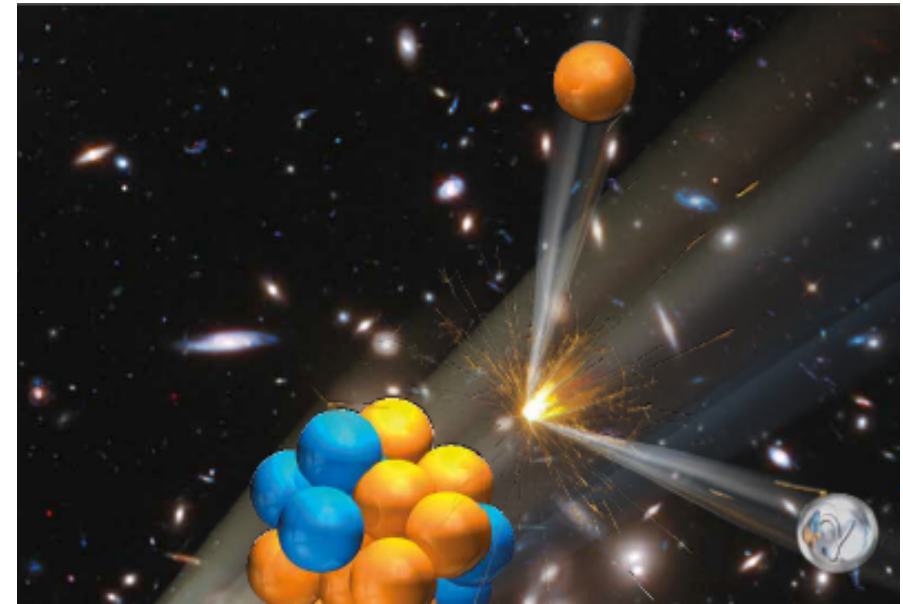
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SPP Proposal Draft Sep 2015

- From carbon and oxygen through calcium, silicon, and iron: We consider all these nuclei the **building blocks of life**, and they have been **synthesised in stars and stellar explosions**.
- **Nuclear fusion reactions** under conditions as they exist in cosmic sources are necessary to make all these species in the abundances that we call “cosmic”, which are quite universal and apparently made life possible.
- How unique, or may be typical, are the conditions in **our solar system** and on our planet?
- How can we **exploit our astrophysics knowledge** to answer that?



The rationale

- Elements of Life: C, O, Ca, Si, Fe have cosmic origin
 - Set aside light elements/BBN, and trans-Fe elements due to other funding/programs
- Nuclear astrophysics is the main focus
 - With links to astrochemistry, astrobiology, nuclear/astrophysics
- Astronomy for this is in a golden age:
 - Gaia, Astro-H/Hitomi, INTEGRAL satellites
 - ALMA, IRAM/NOEMA
- Theory tools have advanced significantly
 - 3D source models; Inhomogeneous chemical evolution
- German leading roles to be held up: stars, SNe

Status of this proposal

- NOT submitted in Oct 2015
- Awaited success (or not) of smaller-scale and regional funding proposals (FG, SFB)
- Needs to be worked out in detail
 - Implementing the above general ideas
 - Working out the strengths and group links
- Needs a strong team of leaders, who see this as their priority and are capable coordinators
- *Shall we do this? → please discuss!*